

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-194943

(43)Date of publication of application : 15.07.1994

(51)Int.CI.

G03G 15/08

G03G 9/087

(21)Application number : 04-344559

(71)Applicant : CANON INC

(22)Date of filing : 24.12.1992

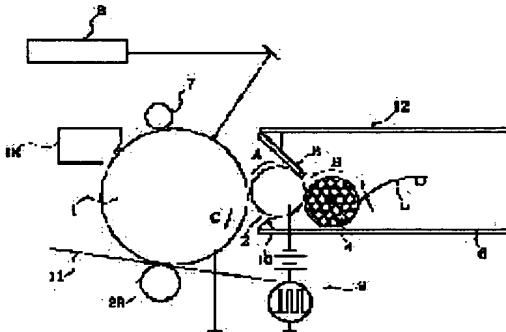
(72)Inventor : SAITO MASUAKI
KOBAYASHI TETSUYA
UCHIYAMA AKIHIKO
KOBAYASHI TATSUYA
ENOMOTO NAOKI
SASAME HIROSHI
KOBAYASHI HIROYUKI

(54) DEVELOPING METHOD

(57)Abstract:

PURPOSE: To attain a clear image without fogging while keeping sufficient image density by specifying relation among the circumferential speed of a developing sleeve, toner density and toner sticking quantity.

CONSTITUTION: When it is assumed that the circumferential speed of an electrostatic latent image carrier 1 is V_d (cm/s), the circumferential speed of the developing sleeve 2 is V_s (cm/s), the toner density is ρ (g/cm³), and the toner sticking quantity on the developing sleeve 2 in M (g/cm²), either of following conditions is satisfied: $0.2 \times 10^{-3} \leq M/\rho < 0.4 \times 10^{-3}$ (cm), and $(M/\rho).(V_s/V_d) \geq 0.5 \times 10^{-3}$ (cm). Or $0.4 \times 10^{-3} \leq M/\rho < 0.6 \times 10^{-3}$ (cm), and $(M/\rho).(V_s/V_d) \geq 0.7 \times 10^{-3}$. Or $0.6 \times 10^{-3} \leq M/\rho < 0.7 \times 10^{-3}$ (cm), and $(M/\rho).(V_s/V_d) \geq 0.8 \times 10^{-3}$ (cm).



- [Date of final disposal for application]
- [Patent number]
- [Date of registration]
- [Number of appeal against examiner's decision of rejection]
- [Date of requesting appeal against examiner's decision of rejection]
- [Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

[JAPANESE] [JP,06-194943,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS
DRAWINGS

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] In the development method of having the following, going by the aforementioned gap, making the toner in the toner thin layer formed in the aforementioned developing roller move onto an electrostatic latent-image support, and developing an electrostatic latent image When setting [the peripheral velocity of the aforementioned electrostatic latent-image support / the peripheral velocity of Vd (cm/s) and the aforementioned developing roller] toner coating weight on rho (g/cm³) and the aforementioned developing roller to M (g/cm²) for the density of Vs (cm/s) and a toner, The development method characterized by satisfying the formula of the following 1, or 2 and 3. The developing roller which kept the gap in the electrostatic latent-image support, and has been arranged Toner thin layer means forming which forms a toner thin layer in the front face of this developing roller

$$1.0.2 \times 10^{-3} \leq M/\rho \leq 0.4 \times 10^{-3} \text{ (cm)}$$

$$(M/\rho) - (V_s/V_d) \geq 0.5 \times 10^{-3} \text{ (cm)}$$

$$2.0.4 \times 10^{-3} \leq M/\rho \leq 0.6 \times 10^{-3} \text{ (cm)}$$

$$(M/\rho) - (V_s/V_d) \geq 0.7 \times 10^{-3} \text{ (cm)}$$

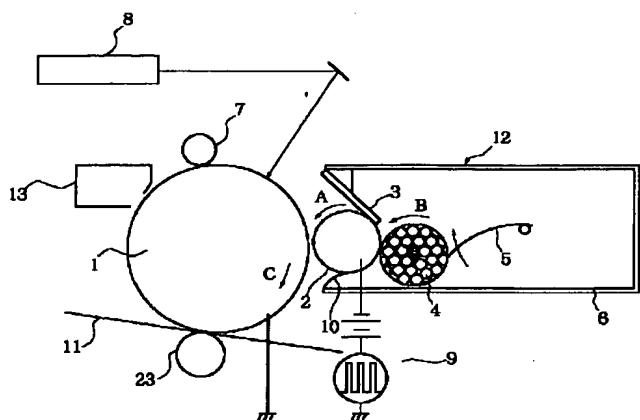
$$3.0.6 \times 10^{-3} \leq M/\rho \leq 0.7 \times 10^{-3} \text{ (cm)}$$

$$(M/\rho) - (V_s/V_d) \geq 0.8 \times 10^{-3} \text{ (cm)}$$

[Claim 2] The binding resin of the aforementioned toner contains the polyester resin generated from the monomer constituent which contains the following component (a), (b), (c), and (d) at least as a principal component. The hydroxyl values of this polyester resin are 10-20, and weight average molecular weight is 13000-20000. The development method according to claim 1 characterized by for number average molecular weight being 5000-8000, and the ratios of weight-average-molecular-weight (Mw) / number average molecular weight (Mn) being 2-3.5. The divalent aromatic system acid component chosen from an isophthalic acid, a terephthalic acid, and its derivative (a) 25-35-mol% of the total amount of monomers (b) The trivalent aromatic system acid component chosen from trimellitic acid and its derivative 2 - four-mol% of the total amount of monomers (c) It is 45 - 60-mol% of the total amount of monomers about 12 - 18-mol% of the total amount of monomers, the formation of (d) propoxy or, and the etherification diphenol component that ethoxylated in the divalent acid component chosen from a dodecetyl succinic acid, an octyl succinic acid, and its anhydride at least.

[Translation done.]

Drawing selection [Representative drawing]



[Translation done.]

Copyright (C); 2000 Japan Patent Office

[JAPANESE] [JP,06-194943,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS
DRAWINGS

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the development method of developing an electrostatic latent image using the developer which does not contain the carrier particle in 2 component developer, and the so-called 1 component developer.

[0002]

[Description of the Prior Art] When using the 1 component developer (henceforth a toner) and developing an electrostatic latent image, a toner acquires the friction charge in which development of a latent image is possible by the developing roller or friction which it is with toner thickness specification-part material further.

[0003] As for the concentration of the record picture which, on the other hand, imprints the toner image formed in the latent-image supporter to imprint material, and is acquired, 1.4 to 1.5 or more are desirable at optical density, and in order to obtain this picture concentration, it must make [many] the amount of the toner which moves onto an electrostatic latent-image support from a developing roller. Therefore, in order to obtain sufficient picture concentration conventionally, in the case of a magnetic toner, it is the toner coating weight on a developing roller Abbreviation 1.3×10^{-3} g/cm² In the case of a nonmagnetic toner, it is abbreviation 0.8×10^{-3} g/cm² above. It has set up above.

[0004]

[Problem(s) to be Solved by the Invention] However, the toner near the center of a toner layer having un-arranged [of polarity being opposite to regular polarity, or fully not being charged], although the toner a developing roller and near the toner thickness specification-part material can be enough rubbed against these members and will fully be regularly charged, if a toner layer is set up thickly as mentioned above.

[0005] Namely, if the force of electric field in which the toner which has not been charged regularly as mentioned above arrived at the development field, and was formed of development bias is received Since it flies towards the part in which the latent image on a photoconductor drum is not formed, and it becomes fogging and the toner whose amount of electrifications is not enough exists mostly, the toner of sufficient amount for the latent-image formation section on a photoconductor drum does not reach, but there is un-arranging [that development efficiency will fall].

[0006] this invention was made in view of the above-mentioned problem, and the place made into the purpose is to offer the developer which attains a clear picture without fogging, maintaining sufficient picture concentration.

[0007]

[Means for Solving the Problem] The development sleeve which this invention kept the gap in the electrostatic latent-image support, and has been arranged that the above-mentioned purpose should be attained, The toner thin layer means forming which forms a toner thin layer in

the front face of this development sleeve is provided. In the development method of going by the aforementioned gap, making the toner in the toner thin layer formed in the aforementioned development sleeve move onto an electrostatic latent-image support, and developing an electrostatic latent image When setting [the peripheral velocity of the aforementioned electrostatic latent-image support / the peripheral velocity of Vd (cm/s) and the aforementioned development sleeve] toner coating weight on rho (g/cm³) and the aforementioned development sleeve to M (g/cm²) for the density of Vs (cm/s) and a toner, It is the development method of satisfying the formula of the following 1, or 2 and 3.

[0008]

$$1.0.2 \times 10^{-3} \leq M/\rho \leq 0.4 \times 10^{-3} \text{ (cm)}$$

$$(M/\rho) - (Vs/Vd) \geq 0.5 \times 10^{-3} \text{ (cm)}$$

$$2.0.4 \times 10^{-3} \leq M/\rho \leq 0.6 \times 10^{-3} \text{ (cm)}$$

$$(M/\rho) - (Vs/Vd) \geq 0.7 \times 10^{-3} \text{ (cm)}$$

$$3.0.6 \times 10^{-3} \leq M/\rho \leq 0.7 \times 10^{-3} \text{ (cm)}$$

$$(M/\rho) - (Vs/Vd) \geq 0.8 \times 10^{-3} \text{ (cm)}$$

[0009]

[Example] Drawing 1 is image formation equipment equipped with the developer 12 which used the nonmagnetic toner, and the front face of the electrophotography photoconductor drum 1 as an electrostatic latent-image support which ** four times in the direction of arrow C with the primary electrification vessel 7 as a printing process is uniformly charged in negative polarity. Subsequently, picture exposure is performed by the aligner 8 which uses a laser beam as the light source based on image information, and a latent image is formed on a photoconductor drum 1. Next, this latent image is formed into a visible image by reversal development with a nonmagnetic toner with a development counter 12. The toner image on a photoconductor drum 1 is imprinted on the imprint material 11, and a transfer residual toner is cleaned with a cleaner 13. It is fixed to the imprint material 11 by which the toner image was imprinted by the non-illustrated fixing assembly, and it obtains a permanent image.

[0010] a development counter 12 -- the inside of a toner bottle 6 -- toner conveyance -- the application roller 4 rotates in the direction of arrow B, and applies the nonmagnetic toner as a 1 component developer stored in the toner bottle 6 on the development sleeve 2 so that it may have the application roller 4 for conveying a toner to about two conductive development sleeve as a member 5 and a developing roller rotated in the direction of arrow A and may have relative velocity to the development sleeve 2 It is more desirable for the application roller 4 to be sponge or to give knurling tool processing or brush-like processing, in order to make this application perform good.

[0011] The applied toner is regulated by predetermined thickness with the elastic blade 3. the member in which the elastic blade 3 has elasticity, such as polyurethane rubber, -- the member of the shape of a sheet, such as polyurethane rubber, is stuck on the member which has elasticity, such as a simple substance and phosphor bronze And the pressure welding of the blade 3 is elastically carried out to the sleeve 2.

[0012] Even regulation of ** toner thickness is thinner than the minimum gap (50-500 micrometers) between a drum 1 and a sleeve 2 in the development section which develops a latent image with a blade 3. Therefore, the so-called non-contact development is performed. That is, a toner flies from a sleeve 2 and adheres to the latent image of a drum 1.

[0013] In order to improve development efficiency, the oscillating bias voltage which superimposed alternating voltage on direct current voltage from the power supply 9 is impressed to a sleeve 2, and the oscillating electric field which the sense reverses by turns are formed in the development section of this.

[0014] A toner is charged in negative polarity mainly in friction with a sleeve 2, when rubbed by the sleeve 2 with a roller 4, and when passing the nip of a blade 3 and a sleeve 2.

[0015] The result of an experiment of this example in the development counter of the

above-mentioned composition is shown in Table 1. the ratio [as opposed to / in Table 1, a horizontal train is the amount M of toner support on the developer support after the toner regulation with an elastic blade (g/cm²), and / the peripheral velocity of an electrostatic latent-image support in a column] of the peripheral velocity of a development sleeve -- it is Vs/Vd, and in this experiment, the peripheral velocity of an electrostatic latent-image support is fixed to 6.0 cm/sec., and it carries out adjustable [only of the peripheral velocity of a development sleeve] When, as for the sign of front Naka, quality of image with optical density [in the paper] practically sufficient [1.5 or more and fogging] at 1% or less is obtained for "O", when, as for concentration, fogging is a little conspicuous at 1 - 2% sufficiently but, "x" of "*" is [concentration] the case where fogging is considerably conspicuous at 2% or more, sufficiently but. Or less in 1.5, picture concentration of "U" is thin or its concentration is the case where picture concentration becomes uneven.

[0016] **** -- it set, fogging was measured using the reflection density meter TC-6DS type by Tokyo Denshoku Co., Ltd., and the value computed from the following formulas was used (Reflection factor of the imprint object before image formation) - (reflection factor of the imprint ***** picture section after image formation) (%)

[0017]

[Table 1]

表 1

$\frac{M}{V_s/V_d}$ (g/cm ³)	0.1×10^{-3}	0.2×10^{-3}	0.3×10^{-3}	0.4×10^{-3}	0.5×10^{-3}	0.6×10^{-3}	0.7×10^{-3}	0.8×10^{-3}	1.0×10^{-3}
0.8							ウ		
1.0						ウ	ウ	△	
1.2				ウ	ウ	ウ	○		
1.4				○	○	○			
1.6						○			
1.8		ウ	○	○		○	○	△	×
2.0									
2.2									
2.4									
2.6	ウ	○	○			○	△	×	
2.8									
3.0		○							

[0018] Since the density rho of the nonmagnetic toner used for this example is 1.0 g/cm³, if the value of Vd, Vs, rho, and M in a setup of "O" of front Naka is substituted for the following formulas, the relation of the following formulas will be materialized in all setup.

[0019]

$$1.0.2 \times 10^{-3} \leq M/\rho \leq 0.4 \times 10^{-3} \text{ (cm)}$$

$$(M/\rho) - (V_s/V_d) \geq 0.5 \times 10^{-3} \text{ (cm)}$$

$$2.0.4 \times 10^{-3} \leq M/\rho \leq 0.6 \times 10^{-3} \text{ (cm)}$$

$$(M/\rho) - (V_s/V_d) \geq 0.7 \times 10^{-3} \text{ (cm)}$$

$$3.0.6 \times 10^{-3} \leq M/\rho \leq 0.7 \times 10^{-3} \text{ (cm)}$$

$$(M/\rho) - (V_s/V_d) \geq 0.8 \times 10^{-3} \text{ (cm)}$$

[0020] In addition, the density of a toner says the thing of the weight per unit volume in melting and the state where solidified and it considered as the solid material, on these specifications for

not a thing but the toner of a weight per unit volume of fine particles.

[0021] Next, the case where a magnetic toner is used is explained based on drawing 2. Since the composition of the equipment except a development counter is the same as that of the image formation equipment of drawing 1, explanation is omitted. The development counter has the container 17 which held magnetic 1 component developer 14 which does not contain a carrier particle, i.e., an insulating magnetism toner. By the nonmagnetic development sleeves 19 rotated in the direction of an arrow, such as aluminum and stainless steel, a toner is carried out from a container and conveyed by the development section 21. In the development section 21, minimum spacing was kept at 50-500 micrometers, and the electrophotography photoconductor drum 1 and the development sleeve 19 as an electrostatic latent-image support have countered. And in this development section 21, a toner is given to an electrostatic latent image and negatives are developed.

[0022] The thickness of the magnetic toner layer conveyed by the development section is regulated by the blade 16. Blades are the magnetic substance, such as iron, and have countered through the magnetic pole N1 and the development sleeve 19 of a magnet 15 by which quiescence arrangement was carried out into the development sleeve 19 in between. Therefore, the line of magnetic force from a magnetic pole N1 concentrates to a blade 16, and a magnetic curtain strong between a blade 16 and the development sleeve 19 is formed. On the development sleeve 19, the magnetic toner layer 22 thinner than the gap between a blade 16 and the development sleeve 19 is formed with this magnetic curtain.

[0023] By impressing oscillating bias voltage to a sleeve 19 from a power supply 9, the toner on a sleeve 19 is made to fly towards a drum 1, and adheres to a latent image.

[0024] A toner is charged mainly by friction with a sleeve 19.

[0025] The experimental result by the development counter of the above-mentioned composition is shown in Table 2. Since the density rho of the magnetic toner used for this example is 1.5 g/cm³, if the value of Vd, Vs, rho, and M in a setup of "O" of front Naka is substituted for the above-mentioned formula like the case of a nonmagnetic 1 component toner, the relation of the above-mentioned formula will be materialized in all setup.

[0026]

[Table 2]

表 2

$\frac{M}{V_s/V_d}$	0.2 10^{-8}	0.3 10^{-8}	0.4 10^{-8}	0.5 10^{-8}	0.6 10^{-8}	0.7 10^{-8}	0.8 10^{-8}	0.9 10^{-8}	1.0 10^{-8}	1.1 10^{-8}	1.2 10^{-8}	1.3 10^{-8}	1.4 10^{-8}	1.5 10^{-8}
0.8											ウ			
1.0										ウ				
1.2										○				
1.4							ウ	○	○					
1.6						ウ								
1.8			ウ	○	○			○	○	△	×			×
2.0														
2.2														
2.4														
2.6	ウ	○			○			○		×				
2.8														
3.0	ウ	○												

[0027] By the way, in order to fully electrify a toner, it is desirable to use the fluid outstanding toner.

[0028] By using a toner excellent in the fluidity, while being able to attain the formation of a uniform toner coat layer and friction charge grant on a development sleeve, in a development field, toner flight is performed good according to impression of development bias, and-izing can be carried out [a visible image] as a toner image faithful to a latent image, without forming the state where the toner particle condensed to the latent image on a photoconductor drum by the ability of formation of a uniform powder cloud to be performed.

[0029] The fluidity index in drawing 3 contains a resin and a coloring matter at least, it adheres to fluid improvement material strongly uniformly, so that this numeric value is small, and it is the index of how much fluid improvement material has adhered in homogeneity to the classification article front face which is 5-12 micrometers of volume mean particle diameters strongly, and its

fluidity improves.

[0030] Conventionally, the measuring method of a toner fluidity index took the following methods with the well-known powder circuit tester ([by Hosokawa Micron CORP.] PT-D type), and measured. Measurement environment is set to 23 degrees C and 60%RH.

[0031] After leaving a toner under measurement environment for 12 hours, weighing capacity of the 5.0g is carried out correctly. The sieve of 100 meshes (150 micrometers of openings), 200 meshes (75 micrometers of openings), and 400 meshes (38 micrometers of openings) is set to a shake table in piles from a top.

[0032] The 5.0g toner which carried out weighing capacity correctly is used calmly (on 100 meshes), and it is made to vibrate for 15 seconds with the back of 2, and the amplitude of 1mm.

[0033] The amount of toners which remained on each sieve calmly is weighed precisely.

[0034] (Amount (gof toners) which remained on 100 meshes) / 5x100 a(amount of toners which remained on 200 meshes (g))/5x100x3/5 .. b(amount of toners which remained on 400 meshes (g))/5x100x1/5 .. c fluidity-index (%) =a+b+c [0035] In drawing 1 , as for a setup of a development counter, and Vs, Vd and M, concentration is obtained by the experiment of drawing 3 1.5 or more, using a nonmagnetic toner, and fogging is also 1% or less.

[0036] A relation like drawing 3 is obtained from the value of the fluidity index of the toner obtained from the above-mentioned formula, and the value of fogging on a transfer paper.

[0037] Scattering of a toner becomes remarkable in using the nonmagnetic toner which cannot regulate the toner by the MAG since formation of a powder cloud is performed very actively when a toner arrives at [a fluidity index] a development field in 2% or less of field in drawing 3 especially.

[0038] If a fluidity index becomes high, the movement of a toner becomes bad at the time of the friction charge grant by the specification part, when the number of times of contact with a blade or a development sleeve becomes fewer, a toner will stop fully charging and a reversal toner will increase.

[0039] If a fluidity index exceeds 20% as shown in drawing 3 , the value of fogging will exceed 3%. For this reason, in order to acquire the high-definition picture in which fogging is not conspicuous, as for the fluidity index of the toner to be used, it is desirable that it is 20% or less.

[0040] Since it is desirable for the value of fogging in a monochrome image to be 1% or less in order to stop the total amount of fogging in the color picture formation equipment on which many especially toner images are put, the fluidity index of a toner becomes 10% or less.

[0041] However, when the fluidity index mentioned above uses for the developer which showed 20% or less of toner to drawing 1 , A toner tends to flow into the crevice between between easily. the fluidity of a toner -- each composition in the good hatchet development counter 12 -- a member -- if it is in the developer by which the big crevice was especially formed between application roller 4 edge and the toner bottle 6 wall section, without the toner which entered the crevice is supplied to the development sleeve 2 -- conveyance -- since a toner is supplied from a member 5, toner condensation will be caused

[0042] When the peripheral-speed ratio of a photoconductor drum and a development sleeve is still higher, in order to rotate at high speed, while the stress which joins a toner increases, in order to carry out the temperature rise of the application roller 4 and the development sleeve 2, the condensed toner has a possibility of carrying out ***** solidification gradually, under hot environments (room temperature of 30 degrees C or more).

[0043] As for the glass transition temperature ("Tg" is called hereafter) of this to a toner, it is desirable that it is 60 degrees C or more. Moreover, since each color toner needs to carry out ***** color mixture uniformly at the time of fixing in order to obtain a good color reproduction, when forming a color picture for cyanogen, a Magenta, yellow, and the toner image of four colors of black in piles especially and it is necessary to use the low toner of toner softening temperature, as for Tg, it is desirable that it is 67 degrees C or less.

[0044] Measurement of Tg was measured using a differential-thermal-analysis measuring device

(DSC measuring device) and DSC-7 (PerkinElmer, Inc. make). Weighing capacity of the 5–20mg of the measurement samples is carried out precisely [it is desirable and] 10mg. This is put in into an aluminum pan, and using the empty aluminum pan as a reference, the next operation is performed in order to eliminate all histories first. It is made to go up by 10 degrees C/min from a room temperature to 200 degrees C under N2 atmosphere, and maintains for 10 minutes at 200 degrees C. It quenches after that, lowers to 10 degrees C, and maintains for 10 minutes at 10 degrees C. Then, it goes up to 200 degrees C by 10 degrees C of programming rates, and min. The endothermic peak of the main peak in the range of 40–100-degree C temperature is acquired by this programming rate. Let the intersection of the middle line of the base line of the back before an endothermic peak comes out at this time, and a differential heat curve be the glass transition temperature T_g in this invention (refer to drawing 4).

[0045] By setting [in the case of monochrome image formation] up the fluidity index of a toner to 2 – 10% 2 to 20% like the above in color picture formation Furthermore, when becoming possible to prevent fogging certainly and forming a color picture using a nonmagnetic 1 component toner, by making T_g of a toner into 67 degrees C from 60 degrees C, there is no possibility that toner weld may occur under hot environments, and it becomes possible to also attain sufficient color-reproduction nature.

[0046] When the toner indicated by Japanese Patent Application No. No. 152219 [four to] in this example was used, as described above, high-definition picture also with the sufficient color reproduction at the time of fixing without fogging was acquired, and toner weld was not generated under hot environments (30 degrees C).

[0047] The binding resin of a toner with the toner which **(ed) and was indicated by the above-mentioned application The following component (a), The polyester resin generated from the monomer constituent which contains (b), (c), and (d) at least is contained as a principal component. It is the toner characterized by for the hydroxyl values of this polyester resin being 10–20, for weight average molecular weight being 13000–20000, for number average molecular weight being 5000–8000, and the ratios of weight-average-molecular-weight (Mw) / number average molecular weight (Mn) being 2–3.5.

[0048] The divalent aromatic system acid component chosen from an isophthalic acid, a terephthalic acid, and its derivative (a) 25–35-mol% of the total amount of monomers (b) The trivalent aromatic system acid component chosen from trimellitic acid and its derivative 2 – four-mol% of the total amount of monomers (c) It is 45 – 60-mol% of the total amount of monomers about 12 – 18-mol% of the total amount of monomers, the formation of (d) propoxy or/, and the etherification diphenol component that ethoxylated in the divalent acid component chosen from a dodecenyloxy succinic acid, an octyl succinic acid, and its anhydride at least.

[0049] Drawing 5 explains the following example. In addition, what carries out the same composition operation as the example of drawing 1 attaches the same sign, and omits explanation.

[0050] from the member in which the elastic blade 3 has elasticity, such as polyurethane rubber and phosphor bronze, in drawing 5 -- changing -- the electrification polarity of a toner -- reversed polarity -- and the member 24 of the shape of a sheet which has the property in which it is charged strongly is stuck on the toner and the portion which ****

[0051] Although nylon, cellophane, etc. which show the property of just being charged strongly as a sheet member are used in order that the toner used for this example may show negative electrification nature, the point of opposite abrasiveness and environmental stability etc. to nylon is desirable.

[0052] The amount of electrifications of the toner under each environment in the case where the blade of only polyurethane rubber and the blade which stuck the nylon sheet on the surface of polyurethane rubber are used, and the relation of quality of image are shown in Table 3.

[0053] As for a setup of a development counter, and Vs, Vd and M, concentration is obtained by the experiment of Table 3 1.5 or more like the example of drawing 1 under 23 degrees C, and

50% environment of RH, using a nonmagnetic toner, and fogging is also 1% or less.

[0054] In performing this comparison examination, in the case of the blade of only polyurethane rubber, compared with the blade which stuck the nylon sheet, the contact pressure to the development sleeve of a blade is highly set up so that both friction may become almost equal under the environment of ordinary temperature normal relative humidity.

[0055]

[Table 3]

表 3

帶電量 (μ C/g)	23°C 50% R.H.	15°C 10% R.H.	30°C 80% R.H.
画質			
ウレタンゴムのみ	-15 ○	-40 濃度不足	-6 カブリ多し
ナイロンシート 貼り付け	-18 ○	-20 ○	-15 ○

[0056] Only in the case of polyurethane rubber, since the set pressure of a blade is high under low-humidity/temperature environment, a toner carries out [a blade] a charge up too much, concentration runs short, and reversal fogging has occurred under a high-humidity/temperature environment, without the ability fully giving a friction charge to a toner so that clearly from Table 3. On the other hand, when the sheet of strong positive electrification nature is used for a blade, without being influenced by environment only from polyurethane rubber, it turns out that the friction charge is certainly given to the toner, and it turns out that fogging is not generated further, either.

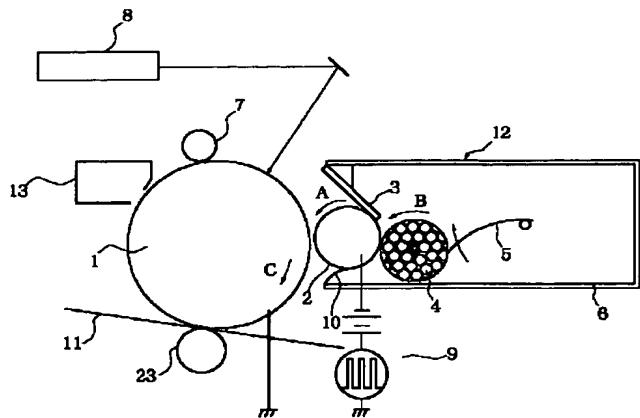
[0057] If it is made a setup which satisfies picture concentration and fogging under the environment of ordinary temperature normal relative humidity like an example 1 by using the sheet which carries out triboelectrification to a blade at a toner and reversed polarity as explained above, it will become possible to be stabilized under the environment of low-humidity/temperature from under the environment of heat and high humidity, and to attain high definition.

[0058]

[Effect of the Invention] Fogging is not generated in order to attain the concentration of sufficient picture by the above explanation according to this invention, keeping the toner layer on a development sleeve thin so that clearly.

[Translation done.]

Drawing selection [Representative drawing]



[Translation done.]

Copyright (C); 2000 Japan Patent Office

JAPANESE [JP,06-194943,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS
DRAWINGS

[Translation done.]

*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

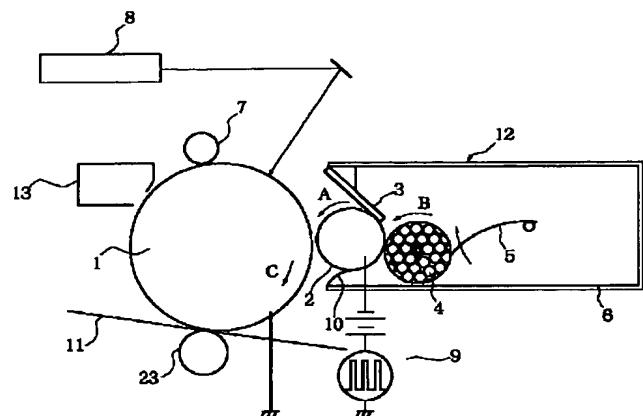
1. This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL FIELD

[Industrial Application] this invention relates to the development method of developing an electrostatic latent image using the developer which does not contain the carrier particle in 2 component developer, and the so-called 1 component developer.

[Translation done.]

Drawing selection [Representative drawing]



[Translation done.]

Copyright (C); 2000 Japan Patent Office

[JAPANESE] [JP,06-194943,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS
DRAWINGS

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
3. In the drawings, any words are not translated.

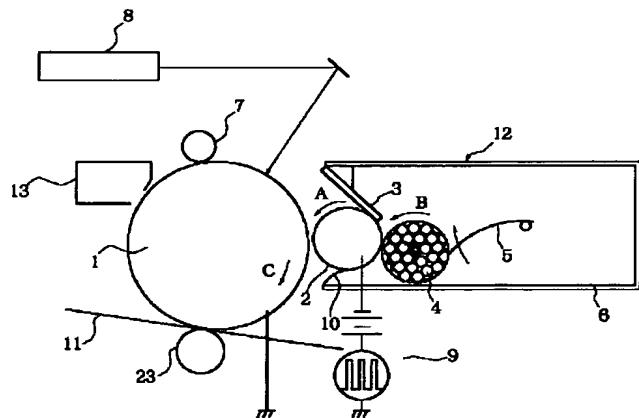
PRIOR ART

[Description of the Prior Art] When using the 1 component developer (henceforth a toner) and developing an electrostatic latent image, a toner acquires the friction charge in which development of a latent image is possible by the developing roller or friction which it is with toner thickness specification-part material further.

[0003] As for the concentration of the record picture which, on the other hand, imprints the toner image formed in the latent-image supporter to imprint material, and is acquired, 1.4 to 1.5 or more are desirable at optical density, and in order to obtain this picture concentration, it must make [many] the amount of the toner which moves onto an electrostatic latent-image support from a developing roller. Therefore, in order to obtain sufficient picture concentration conventionally, in the case of a magnetic toner, it is the toner coating weight on a developing roller Abbreviation 1.3×10^{-3} g/cm² In the case of a nonmagnetic toner, it is abbreviation 0.8×10^{-3} g/cm² above. It has set up above.

[Translation done.]

Drawing selection [Representative drawing]



[Translation done.]

C pyright (C); 2000 Japan Patent Office

JAPANESE [JP,06-194943,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS
DRAWINGS

[Translation done.]

*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

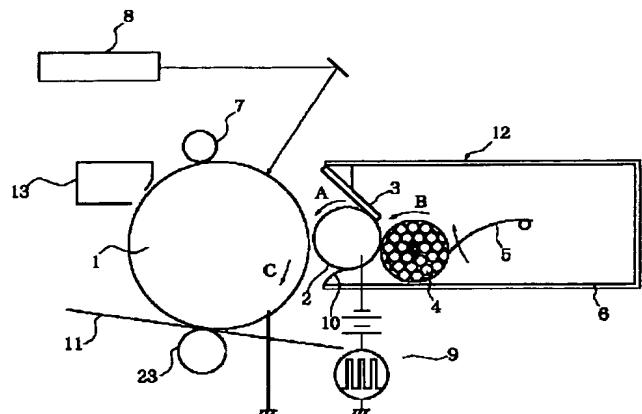
1. This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
3. In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] Fogging is not generated in order to attain the concentration of sufficient picture by the above explanation according to this invention, keeping the toner layer on a development sleeve thin so that clearly.

[Translation done.]

Drawing selection [Representative drawing]



[Translation done.]

Copyright (C); 2000 Japan Patent Office

JAPANESE [JP,06-194943,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS
DRAWINGS

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

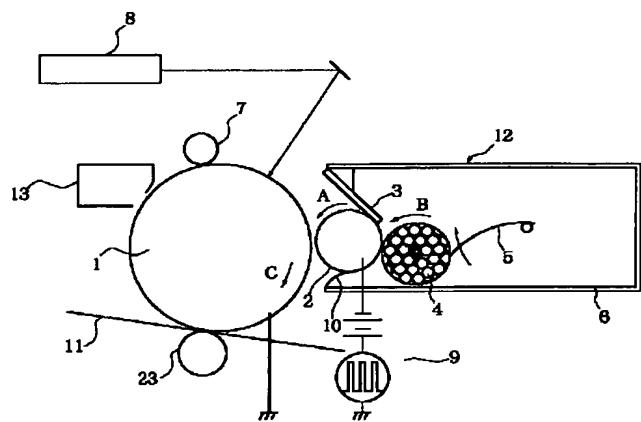
[Problem(s) to be Solved by the Invention] However, the toner near the center of a toner layer having un-arranged [of polarity being opposite to regular polarity, or fully not being charged], although the toner a developing roller and near the toner thickness specification-part material can be enough rubbed against these members and will fully be regularly charged, if a toner layer is set up thickly as mentioned above.

[0005] Namely, if the force of electric field in which the toner which has not been charged regularly as mentioned above arrived at the development field, and was formed of development bias is received Since it flies towards the part in which the latent image on a photoconductor drum is not formed, and it becomes fogging and the toner whose amount of electrifications is not enough exists mostly, the toner of sufficient amount for the latent-image formation section on a photoconductor drum does not reach, but there is un-arranging [that development efficiency will fall].

[0006] this invention was made in view of the above-mentioned problem, and the place made into the purpose is to offer the developer which attains a clear picture without fogging, maintaining sufficient picture concentration.

[Translation done.]

Drawing selection [Representative drawing]



[Translation done.]

Copyright (C); 2000 Japan Patent Office

JAPANESE [JP,06-194943,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS
DRAWINGS

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] The development sleeve which this invention kept the gap in the electrostatic latent-image support, and has been arranged that the above-mentioned purpose should be attained, The toner thin layer means forming which forms a toner thin layer in the front face of this development sleeve is provided. In the development method of going by the aforementioned gap, making the toner in the toner thin layer formed in the aforementioned development sleeve move onto an electrostatic latent-image support, and developing an electrostatic latent image When setting [the peripheral velocity of the aforementioned electrostatic latent-image support / the peripheral velocity of Vd (cm/s) and the aforementioned development sleeve] toner coating weight on rho (g/cm³) and the aforementioned development sleeve to M (g/cm²) for the density of Vs (cm/s) and a toner, It is the development method of satisfying the formula of the following 1, or 2 and 3.

[0008]

$$1.0.2 \times 10^{-3} \leq M/\rho \leq 0.4 \times 10^{-3} \text{ (cm)}$$

$$(M/\rho) - (Vs/Vd) \geq 0.5 \times 10^{-3} \text{ (cm)}$$

$$2.0.4 \times 10^{-3} \leq M/\rho \leq 0.6 \times 10^{-3} \text{ (cm)}$$

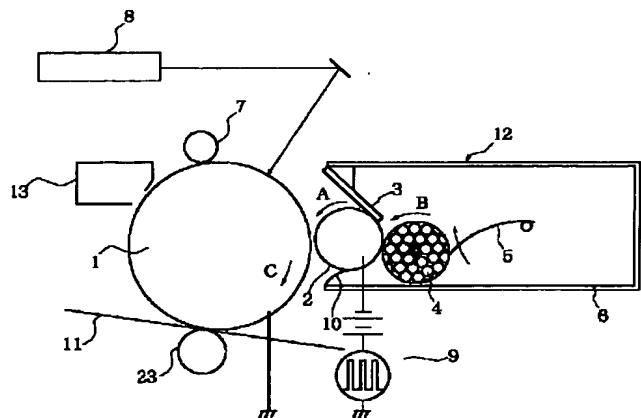
$$(M/\rho) - (Vs/Vd) \geq 0.7 \times 10^{-3} \text{ (cm)}$$

$$3.0.6 \times 10^{-3} \leq M/\rho \leq 0.7 \times 10^{-3} \text{ (cm)}$$

$$(M/\rho) - (Vs/Vd) \geq 0.8 \times 10^{-3} \text{ (cm)}$$

[Translation done.]

Drawing selection [Representative drawing]



[Translation done.]

Copyright (C); 2000 Japan Patent Office

JAPANESE [JP,06-194943,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS
DRAWINGS

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
3. In the drawings, any words are not translated.

EXAMPLE

[Example] Drawing 1 is image formation equipment equipped with the developer 12 which used the nonmagnetic toner, and the front face of the electrophotography photoconductor drum 1 as an electrostatic latent-image support which ** four times in the direction of arrow C with the primary electrification vessel 7 as a printing process is uniformly charged in negative polarity. Subsequently, picture exposure is performed by the aligner 8 which uses a laser beam as the light source based on image information, and a latent image is formed on a photoconductor drum 1. Next, this latent image is formed into a visible image by reversal development with a nonmagnetic toner with a development counter 12. The toner image on a photoconductor drum 1 is imprinted on the imprint material 11, and a transfer residual toner is cleaned with a cleaner 13. It is fixed to the imprint material 11 by which the toner image was imprinted by the non-illustrated fixing assembly, and it obtains a permanent image.

[0010] a development counter 12 -- the inside of a toner bottle 6 -- toner conveyance -- the application roller 4 rotates in the direction of arrow B, and applies the nonmagnetic toner as a 1 component developer stored in the toner bottle 6 on the development sleeve 2 so that it may have the application roller 4 for conveying a toner to about two conductive development sleeve as a member 5 and a developing roller rotated in the direction of arrow A and may have relative velocity to the development sleeve 2 It is more desirable for the application roller 4 to be sponge or to give knurling tool processing or brush-like processing, in order to make this application perform good.

[0011] The applied toner is regulated by predetermined thickness with the elastic blade 3. the member in which the elastic blade 3 has elasticity, such as polyurethane rubber, -- the member of the shape of a sheet, such as polyurethane rubber, is stuck on the member which has elasticity, such as a simple substance and phosphor bronze And the pressure welding of the blade 3 is elastically carried out to the sleeve 2.

[0012] Even regulation of ** toner thickness is thinner than the minimum gap (50-500 micrometers) between a drum 1 and a sleeve 2 in the development section which develops a latent image with a blade 3. Therefore, the so-called non-contact development is performed. That is, a toner flies from a sleeve 2 and adheres to the latent image of a drum 1.

[0013] In order to improve development efficiency, the oscillating bias voltage which superimposed alternating voltage on direct current voltage from the power supply 9 is impressed to a sleeve 2, and the oscillating electric field which the sense reverses by turns are formed in the development section of this.

[0014] A toner is charged in negative polarity mainly in friction with a sleeve 2, when rubbed by the sleeve 2 with a roller 4, and when passing the nip of a blade 3 and a sleeve 2.

[0015] The result of an experiment of this example in the development counter of the above-mentioned composition is shown in Table 1. the ratio [as opposed to / in Table 1, a horizontal train is the amount M of toner support on the developer support after the toner regulation with an elastic blade (g/cm²), and / the peripheral velocity of an electrostatic

latent-image support in a column] of the peripheral velocity of a development sleeve -- it is V_s/V_d , and in this experiment, the peripheral velocity of an electrostatic latent-image support is fixed to 6.0 cm/sec., and it carries out adjustable [only of the peripheral velocity of a development sleeve] When, as for the sign of front Naka, quality of image with optical density [in the paper] practically sufficient [1.5 or more and fogging] at 1% or less is obtained for "O", when, as for concentration, fogging is a little conspicuous at 1 - 2% sufficiently but, "x" of "*" is [concentration] the case where fogging is considerably conspicuous at 2% or more, sufficiently but. Or less in 1.5, picture concentration of "U" is thin or its concentration is the case where picture concentration becomes uneven.

[0016] **** -- it set, fogging was measured using the reflection density meter TC-6DS type by Tokyo Denshoku Co., Ltd., and the value computed from the following formulas was used (Reflection factor of the imprint object before image formation) - (reflection factor of the imprint ***** picture section after image formation) (%)

[0017]

[Table 1]

表 1

M (g/cm ³) Vs/Vd	0.1 $\times 10^{-3}$	0.2 $\times 10^{-3}$	0.3 $\times 10^{-3}$	0.4 $\times 10^{-3}$	0.5 $\times 10^{-3}$	0.6 $\times 10^{-3}$	0.7 $\times 10^{-3}$	0.8 $\times 10^{-3}$	1.0 $\times 10^{-3}$
0.8							ウ		
1.0						ウ	ウ	△	
1.2				ウ	ウ	ウ	○		
1.4				○	○	○			
1.6						○			
1.8		ウ	○	○		○	○	△	×
2.0									
2.2									
2.4									
2.6	ウ	○	○			○	△	×	
2.8									
3.0		○							

[0018] Since the density rho of the nonmagnetic toner used for this example is 1.0 g/cm³, if the value of Vd, Vs, rho, and M in a setup of "O" of front Naka is substituted for the following formulas, the relation of the following formulas will be materialized in all setup.

[0019]

$$1.0.2 \times 10^{-3} \leq M/\rho \leq 0.4 \times 10^{-3} \text{ (cm)}$$

$$(M/\rho) - (Vs/Vd) \geq 0.5 \times 10^{-3} \text{ (cm)}$$

$$2.0.4 \times 10^{-3} \leq M/\rho \leq 0.6 \times 10^{-3} \text{ (cm)}$$

$$(M/\rho) - (Vs/Vd) \geq 0.7 \times 10^{-3} \text{ (cm)}$$

$$3.0.6 \times 10^{-3} \leq M/\rho \leq 0.7 \times 10^{-3} \text{ (cm)}$$

$$(M/\rho) - (Vs/Vd) \geq 0.8 \times 10^{-3} \text{ (cm)}$$

[0020] In addition, the density of a toner says the thing of the weight per unit volume in melting and the state where solidified and it considered as the solid material, on these specifications for

not a thing but the toner of a weight per unit volume of fine particles.

[0021] Next, the case where a magnetic toner is used is explained based on drawing 2. Since the composition of the equipment except a development counter is the same as that of the image formation equipment of drawing 1, explanation is omitted. The development counter has the container 17 which held magnetic 1 component developer 14 which does not contain a carrier particle, i.e., an insulating magnetism toner. By the nonmagnetic development sleeves 19 rotated in the direction of an arrow, such as aluminum and stainless steel, a toner is carried out from a container and conveyed by the development section 21. In the development section 21, minimum spacing was kept at 50-500 micrometers, and the electrophotography photoconductor drum 1 and the development sleeve 19 as an electrostatic latent-image support have countered. And in this development section 21, a toner is given to an electrostatic latent image and negatives are developed.

[0022] The thickness of the magnetic toner layer conveyed by the development section is regulated by the blade 16. Blades are the magnetic substance, such as iron, and have countered through the magnetic pole N1 and the development sleeve 19 of a magnet 15 by which quiescence arrangement was carried out into the development sleeve 19 in between. Therefore, the line of magnetic force from a magnetic pole N1 concentrates to a blade 16, and a magnetic curtain strong between a blade 16 and the development sleeve 19 is formed. On the development sleeve 19, the magnetic toner layer 22 thinner than the gap between a blade 16 and the development sleeve 19 is formed with this magnetic curtain.

[0023] By impressing oscillating bias voltage to a sleeve 19 from a power supply 9, the toner on a sleeve 19 is made to fly towards a drum 1, and adheres to a latent image.

[0024] A toner is charged mainly by friction with a sleeve 19.

[0025] The experimental result by the development counter of the above-mentioned composition is shown in Table 2. Since the density rho of the magnetic toner used for this example is 1.5 g/cm³, if the value of Vd, Vs, rho, and M in a setup of "O" of front Naka is substituted for the above-mentioned formula like the case of a nonmagnetic 1 component toner, the relation of the above-mentioned formula will be materialized in all setup.

[0026]

[Table 2]

表 2

$\frac{M}{V_s}$ (g/cm ³)	0.2 10^{-8}	0.3 10^{-8}	0.4 10^{-8}	0.5 10^{-8}	0.6 10^{-8}	0.7 10^{-8}	0.8 10^{-8}	0.9 10^{-8}	1.0 10^{-8}	1.1 10^{-8}	1.2 10^{-8}	1.3 10^{-8}	1.4 10^{-8}	1.5 10^{-8}
$\frac{V_s}{V_d}$														
0.8										ウ				
1.0									ウ					
1.2									○					
1.4						ウ	○	○						
1.6					ウ									
1.8		ウ	○	○				○	○	△	×			×
2.0														
2.2														
2.4														
2.6	ウ	○			○				○	×				
2.8														
3.0	ウ	○												

[0027] By the way, in order to fully electrify a toner, it is desirable to use the fluid outstanding toner.

[0028] By using a toner excellent in the fluidity, while being able to attain the formation of a uniform toner coat layer and friction charge grant on a development sleeve, in a development field, toner flight is performed good according to impression of development bias, and-izing can be carried out [a visible image] as a toner image faithful to a latent image, without forming the state where the toner particle condensed to the latent image on a photoconductor drum by the ability of formation of a uniform powder cloud to be performed.

[0029] The fluidity index in drawing 3 contains a resin and a coloring matter at least, it adheres to fluid improvement material strongly uniformly, so that this numeric value is small, and it is the index of how much fluid improvement material has adhered in homogeneity to the classification article front face which is 5-12 micrometers of volume mean particle diameters strongly, and its

fluidity improves.

[0030] Conventionally, the measuring method of a toner fluidity index took the following methods with the well-known powder circuit tester ([by Hosokawa Micron CORP.] PT-D type), and measured. Measurement environment is set to 23 degrees C and 60%RH.

[0031] After leaving a toner under measurement environment for 12 hours, weighing capacity of the 5.0g is carried out correctly. The sieve of 100 meshes (150 micrometers of openings), 200 meshes (75 micrometers of openings), and 400 meshes (38 micrometers of openings) is set to a shake table in piles from a top.

[0032] The 5.0g toner which carried out weighing capacity correctly is used calmly (on 100 meshes), and it is made to vibrate for 15 seconds with the back of 2, and the amplitude of 1mm.

[0033] The amount of toners which remained on each sieve calmly is weighed precisely.

[0034] (Amount (gof toners) which remained on 100 meshes) / 5x100 a(amount of toners which remained on 200 meshes (g))/5x100x3/5 .. b(amount of toners which remained on 400 meshes (g))/5x100x1/5 .. c fluidity-index (%) =a+b+c [0035] In drawing 1 , as for a setup of a development counter, and Vs, Vd and M, concentration is obtained by the experiment of drawing 3 1.5 or more, using a nonmagnetic toner, and fogging is also 1% or less.

[0036] A relation like drawing 3 is obtained from the value of the fluidity index of the toner obtained from the above-mentioned formula, and the value of fogging on a transfer paper.

[0037] Scattering of a toner becomes remarkable in using the nonmagnetic toner which cannot regulate the toner by the MAG since formation of a powder cloud is performed very actively when a toner arrives at [a fluidity index] a development field in 2% or less of field in drawing 3 especially.

[0038] If a fluidity index becomes high, the movement of a toner becomes bad at the time of the friction charge grant by the specification part, when the number of times of contact with a blade or a development sleeve becomes fewer, a toner will stop fully charging and a reversal toner will increase.

[0039] If a fluidity index exceeds 20% as shown in drawing 3 , the value of fogging will exceed 3%. For this reason, in order to acquire the high-definition picture in which fogging is not conspicuous, as for the fluidity index of the toner to be used, it is desirable that it is 20% or less.

[0040] Since it is desirable for the value of fogging in a monochrome image to be 1% or less in order to stop the total amount of fogging in the color picture formation equipment on which many especially toner images are put, the fluidity index of a toner becomes 10% or less.

[0041] However, when the fluidity index mentioned above uses for the developer which showed 20% or less of toner to drawing 1 , A toner tends to flow into the crevice between between easily. the fluidity of a toner -- each composition in the good hatchet development counter 12 -- a member -- if it is in the developer by which the big crevice was especially formed between application roller 4 edge and the toner bottle 6 wall section, without the toner which entered the crevice is supplied to the development sleeve 2 -- conveyance -- since a toner is supplied from a member 5, toner condensation will be caused

[0042] When the peripheral-speed ratio of a photoconductor drum and a development sleeve is still higher, in order to rotate at high speed, while the stress which joins a toner increases, in order to carry out the temperature rise of the application roller 4 and the development sleeve 2, the condensed toner has a possibility of carrying out ***** solidification gradually, under hot environments (room temperature of 30 degrees C or more).

[0043] As for the glass transition temperature ("Tg" is called hereafter) of this to a toner, it is desirable that it is 60 degrees C or more. Moreover, since each color toner needs to carry out ***** color mixture uniformly at the time of fixing in order to obtain a good color reproduction, when forming a color picture for cyanogen, a Magenta, yellow, and the toner image of four colors of black in piles especially and it is necessary to use the low toner of toner softening temperature, as for Tg, it is desirable that it is 67 degrees C or less.

[0044] Measurement of Tg was measured using a differential-thermal-analysis measuring device

(DSC measuring device) and DSC-7 (PerkinElmer, Inc. make). Weighing capacity of the 5–20mg of the measurement samples is carried out precisely [it is desirable and] 10mg. This is put in into an aluminum pan, and using the empty aluminum pan as a reference, the next operation is performed in order to eliminate all histories first. It is made to go up by 10 degrees C/min from a room temperature to 200 degrees C under N2 atmosphere, and maintains for 10 minutes at 200 degrees C. It quenches after that, lowers to 10 degrees C, and maintains for 10 minutes at 10 degrees C. Then, it goes up to 200 degrees C by 10 degrees C of programming rates, and min. The endothermic peak of the main peak in the range of 40–100-degree C temperature is acquired by this programming rate. Let the intersection of the middle line of the base line of the back before an endothermic peak comes out at this time, and a differential heat curve be the glass transition temperature Tg in this invention (refer to drawing 4).

[0045] By setting [in the case of monochrome image formation] up the fluidity index of a toner to 2 – 10% 2 to 20% like the above in color picture formation Furthermore, when becoming possible to prevent fogging certainly and forming a color picture using a nonmagnetic 1 component toner, by making Tg of a toner into 67 degrees C from 60 degrees C, there is no possibility that toner weld may occur under hot environments, and it becomes possible to also attain sufficient color-reproduction nature.

[0046] When the toner indicated by Japanese Patent Application No. No. 152219 [four to] in this example was used, as described above, high-definition picture also with the sufficient color reproduction at the time of fixing without fogging was acquired, and toner weld was not generated under hot environments (30 degrees C).

[0047] The binding resin of a toner with the toner which **(ed) and was indicated by the above-mentioned application The following component (a), The polyester resin generated from the monomer constituent which contains (b), (c), and (d) at least is contained as a principal component. It is the toner characterized by for the hydroxyl values of this polyester resin being 10–20, for weight average molecular weight being 13000–20000, for number average molecular weight being 5000–8000, and the ratios of weight-average-molecular-weight (Mw) / number average molecular weight (Mn) being 2–3.5.

[0048] The divalent aromatic system acid component chosen from an isophthalic acid, a terephthalic acid, and its derivative (a) 25–35-mol% of the total amount of monomers (b) The trivalent aromatic system acid component chosen from trimellitic acid and its derivative 2 – four-mol% of the total amount of monomers (c) It is 45 – 60-mol% of the total amount of monomers about 12 – 18-mol% of the total amount of monomers, the formation of (d) propoxy or/, and the etherification diphenol component that ethoxylated in the divalent acid component chosen from a dodecanyl succinic acid, an octyl succinic acid, and its anhydride at least.

[0049] Drawing 5 explains the following example. In addition, what carries out the same composition operation as the example of drawing 1 attaches the same sign, and omits explanation.

[0050] from the member in which the elastic blade 3 has elasticity, such as polyurethane rubber and phosphor bronze, in drawing 5 -- changing -- the electrification polarity of a toner -- reversed polarity -- and the member 24 of the shape of a sheet which has the property in which it is charged strongly is stuck on the toner and the portion which ****

[0051] Although nylon, cellophane, etc. which show the property of just being charged strongly as a sheet member are used in order that the toner used for this example may show negative electrification nature, the point of opposite abrasiveness and environmental stability etc. to nylon is desirable.

[0052] The amount of electrifications of the toner under each environment in the case where the blade of only polyurethane rubber and the blade which stuck the nylon sheet on the surface of polyurethane rubber are used, and the relation of quality of image are shown in Table 3.

[0053] As for a setup of a development counter, and Vs, Vd and M, concentration is obtained by the experiment of Table 3 1.5 or more like the example of drawing 1 under 23 degrees C, and

50% environment of RH, using a nonmagnetic toner, and fogging is also 1% or less.

[0054] In performing this comparison examination, in the case of the blade of only polyurethane rubber, compared with the blade which stuck the nylon sheet, the contact pressure to the development sleeve of a blade is highly set up so that both friction may become almost equal under the environment of ordinary temperature normal relative humidity.

[0055]

[Table 3]

表 3

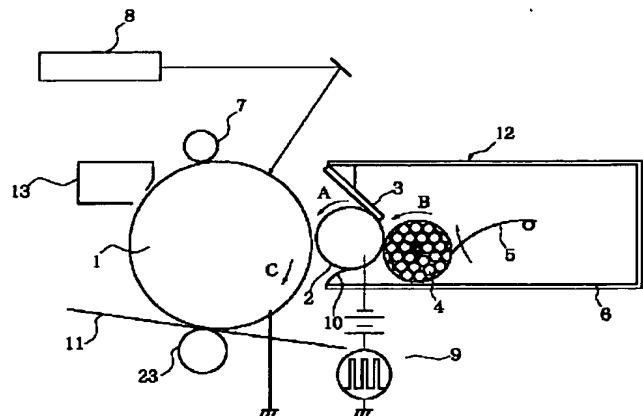
帶電量 (μ C/g)	23°C 50% R.H.	15°C 10% R.H.	30°C 80% R.H.
画質			
ウレタンゴムのみ	-15 ○	-40 濃度不足	-6 カブリ多し
ナイロンシート 貼り付け	-18 ○	-20 ○	-15 ○

[0056] Only in the case of polyurethane rubber, since the set pressure of a blade is high under low-humidity/temperature environment, a toner carries out [a blade] a charge up too much, concentration runs short, and reversal fogging has occurred under a high-humidity/temperature environment, without the ability fully giving a friction charge to a toner so that clearly from Table 3. On the other hand, when the sheet of strong positive electrification nature is used for a blade, without being influenced by environment only from polyurethane rubber, it turns out that the friction charge is certainly given to the toner, and it turns out that fogging is not generated further, either.

[0057] If it is made a setup which satisfies picture concentration and fogging under the environment of ordinary temperature normal relative humidity like an example 1 by using the sheet which carries out triboelectrification to a blade at a toner and reversed polarity as explained above, it will become possible to be stabilized under the environment of low-humidity/temperature from under the environment of heat and high humidity, and to attain high definition.

[Translation done.]

Drawing selection [Representative drawing]



[Translation done.]

Copyright (C); 2000 Japan Patent Office

JAPANESE [JP,06-194943,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS
DRAWINGS

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Explanatory drawing of one example of this invention.

[Drawing 2] Explanatory drawing of other examples of this invention.

[Drawing 3] Explanatory drawing of the relation between a fluidity index and fogging.

[Drawing 4] Explanatory drawing of Tg.

[Drawing 5] Explanatory drawing of the example of further others of this invention.

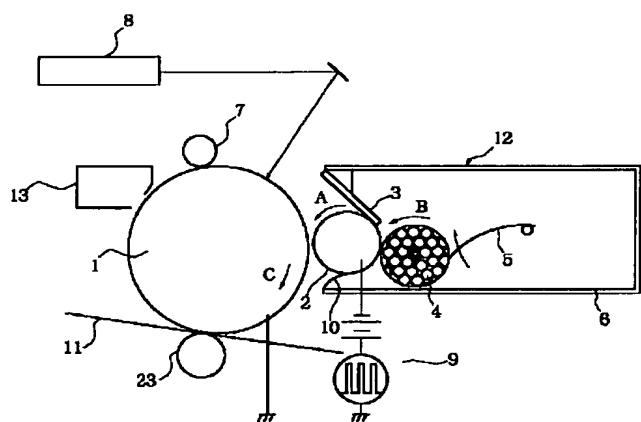
[Description of Notations]

1 Photoconductor Drum

2 Development Sleeve

[Translation done.]

Drawing selection [R presentative drawing]



[Translation done.]

Copyright (C); 2000 Japan Patent Office

JAPANESE [JP,06-194943,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS
DRAWINGS

[Translation done.]

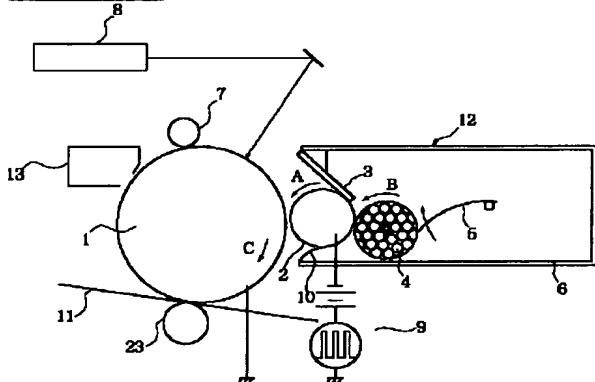
*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

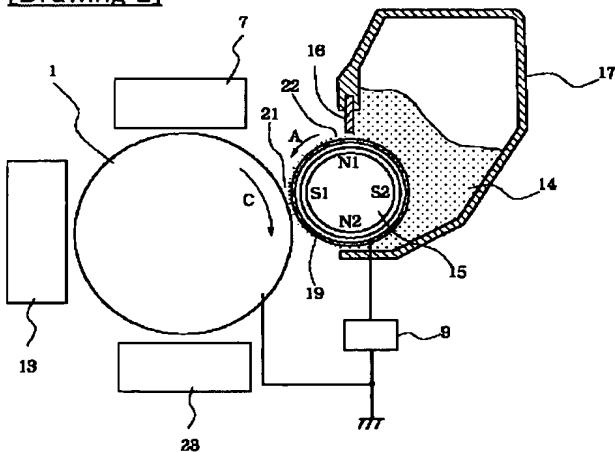
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

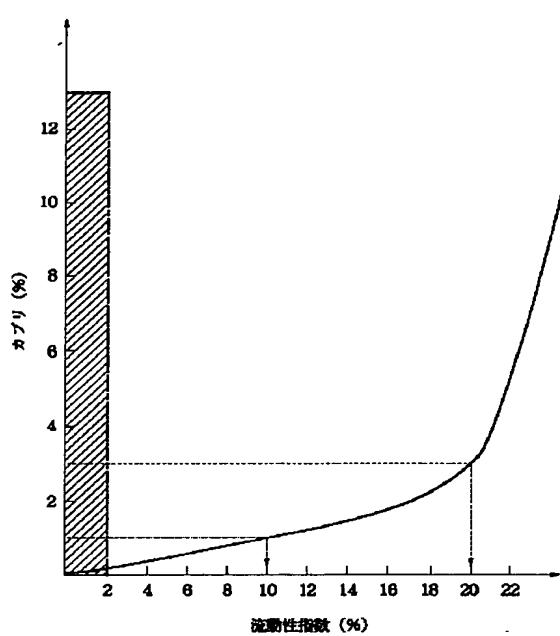
[Drawing 1]



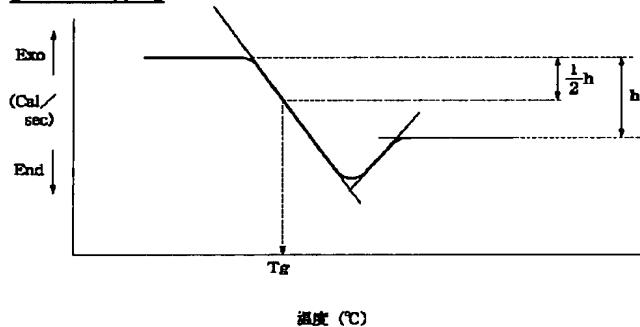
[Drawing 2]



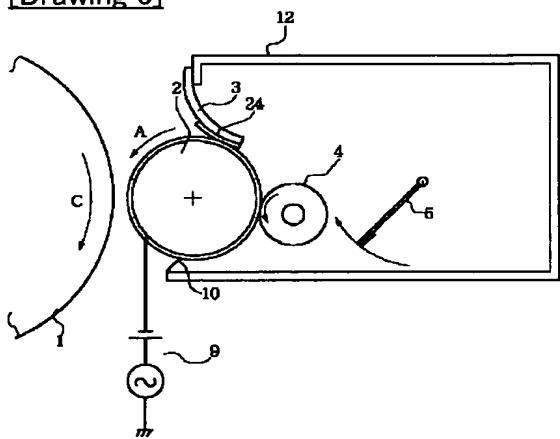
[Drawing 3]



[Drawing 4]

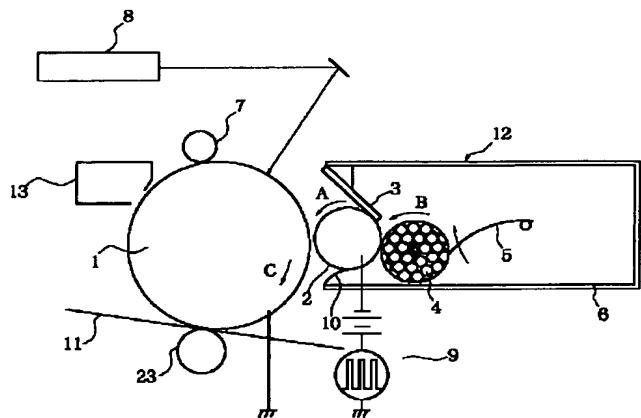


[Drawing 5]



[Translation done.]

Drawing selection [Representative drawing]



[Translation done.]

Copyright (C); 2000 Japan Patent Office

としての電子写真感光ドラム1の表面が一様に負極性に帯電される。次いで画像情報に基づきレーザービームを光源とする露光装置8により画像露光が行われ、感光ドラム1上に像が形成される。次にこの像は現像器12により半導体トナーによりスリープ2にこそる。

【0014】トナーはローラ4によりスリープ2にこそる。付けられる時、及びアード3とスリープ2との距離を通過する時、主としてスリープ2との距離で負極性に帶電される。

【0015】上記構成の現像器における本実施例の実験結果を表1に示す。表1において、横列は弹性フレームによるトナー相制御後の現像部枠体上のトナー相枠量M(g/cm²)であり、縦列は静電荷像枠体の周速度に対する現像スリープの周速度の比V_s/V_dであり、本実験では静電荷像枠体の周速度を6.0 cm/sに固定し、現像スリープの周速度のみを可変させている。表中の記号は、【○】が紙上の光学濃度が1.5以上、カブリが1%以下で平均上十分な画質を得られた場合、「△」は濃度は十分だがカブリが1~2%でやや目立つ場合、「×」は濃度は十分だがカブリが2%以上でかなり目立つ場合である。【×】は濃度が1.5以下で画像濃度が薄いか、画像濃度が不均一になる場合である。

【0016】尚ににおいては、カブリは東京電色社製の反射濃度計TC-6DS型を用いて測定し、以下の式より算出した値を用いた。

(画像形成前の転写率) - (画像形成後の転写率) / (転写率) (%)
【0017】
【表1】

30
【0018】フレード3で規制されたトナー層厚は、滑像を現像する現像部において、ドラム1とスリープ2間の最小間隔(5.0~500 μm)よりも薄い。従って所用接触部像が行なわれる。即ち、トナーはスリープ2から飛翔してドラム1の表面に付着する。

M (g/cm ²) ×10 ⁻⁴	0.1 ×10 ⁻⁴	0.2 ×10 ⁻⁴	0.3 ×10 ⁻⁴	0.4 ×10 ⁻⁴	0.5 ×10 ⁻⁴	0.6 ×10 ⁻⁴	0.7 ×10 ⁻⁴	0.8 ×10 ⁻⁴
V _s /V _d								
0.8							×	
1.0						×	△	
1.2			○	○	○	○	○	
1.4			○	○	○	○	○	
1.6			○	○	○	○	○	
1.8		○	○	○	○	○	△	×
2.0								
2.2								
2.4								
2.6	○	○	○	○	○	○	△	×
2.8								
3.0	○							

【0018】本実施例に用いた半導体トナーの密度は1.0 g/cm³であるため、表中の【○】の設定におけるV_d、V_s、ρ、Mの値を以下の式に代入すると、全ての設定において以下の式の関係が成立する。

【0019】
1. 0.2 × 10⁻³ ≤ M/ρ < 0.4 × 10⁻³ (cm)
(M/ρ) · (V_s/V_d) ≥ 0.5 × 10⁻³ (cm)
2. 0.4 × 10⁻³ ≤ M/ρ < 0.6 × 10⁻³ (cm)
(M/ρ) · (V_s/V_d) ≥ 0.7 × 10⁻³ (cm)
3. 0.6 × 10⁻³ ≤ M/ρ < 0.7 × 10⁻³ (cm)
(M/ρ) · (V_s/V_d) ≥ 0.8 × 10⁻³ (cm)

【0018】本実施例に用いた半導体トナーの密度は粉体の単位体積当りの重量の事ではなく、トナーを溶融、固化して固形物とした固形状態での単位体積当りの重量の事を言う。

【0020】次に磁性トナーを用いた場合について図2をもとに説明する。現像器を除く装置の構成は図1の画像形成装置と同様であるため説明を省略する。現像器はキャリア粒子を含まない磁性1成分現像剤、即ち純粋な磁性トナー1を収容した容器17を有している。トナーは矢印方向に回転するアルミニウム、ステンレス鋼等の非磁性現像スリープ19によって容器から持ち出され、現像部21に供給される。現像部21においては静電荷保持体としての電子写真感光ドラム1と現像シリ

【0020】尚、本明細書でトナーの密度というのは、50 電荷保持体

7
一ブ19は最小間隔が5.0～5.00 μm に保たれが向している。そして、この現像部21において静電潜像にトナーが付与され現像される。
【0.02.2】現像部に保たれる磁性トナー層の厚みはブレード16によって規制される。ブレードは数種の磁性体であり、現像スリーブ19内に静止配置された磁石1.5の磁極N1と現像スリーブ19を間に介して対向している。従って、ブレード16に対して磁極N1からの磁力線が集中し、ブレード16と現像スリーブ19の間に強い磁気カーテンが形成される。この磁気カーテンにより現像スリーブ19上にはブレード16と現像スリーブ19の間の間隔よりも薄い磁性トナー層2が形成される。
【表2】

M (g/cm ²)	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
V_s $\sqrt{V_d}$	10^{-1}	10^{-1}	10^{-1}	10^{-1}	10^{-1}	10^{-1}	10^{-1}	10^{-1}	10^{-1}	10^{-1}	10^{-1}	10^{-1}	10^{-1}	10^{-1}
0.8														
1.0														
1.2														
1.4														
1.6														
1.8														
2.0														
2.2														
2.4														
2.6														
2.8														
3.0														

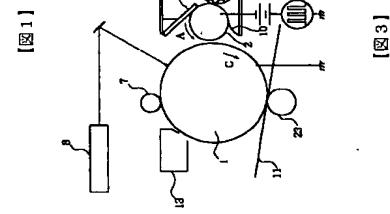
【0.02.3】スリーブ19上のトナーは、スリーブ1.9に電極9から振動ハイアス電圧を印加することによりトム1に向けて飛翔せしめられ、潜像に付着する。

【0.02.4】トナーは主としてスリーブ1.9との摩擦により帶電する。

【0.02.5】上記構成の現像器による実験結果を表2に示す。本実施例に用いた磁性トナーの密度 ρ は1.5 g/cm³であるため、非磁性一分トナーの場合と同様に表中の「 Ω 」の設定における V_d 、 V_s 、 ρ 、 M の値を上記の式に代入すると、全ての設定において上記の式の関係が成立する。

【0.02.6】

【表2】



[図1]

フロントベージの焼き

(72) 発明者 小林 達也
東京都大田区下丸子3丁目30番2号キャノン株式会社内

(72) 発明者 笠志 裕志
東京都大田区下丸子3丁目30番2号キャノン株式会社内

(72) 発明者 小林 達也
東京都大田区下丸子3丁目30番2号キャノン株式会社内

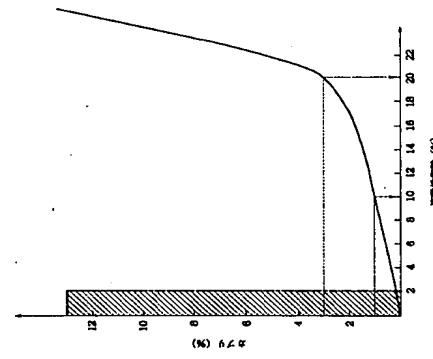
(72) 発明者 笠志 裕志
東京都大田区下丸子3丁目30番2号キャノン株式会社内

(72) 発明者 小林 達也
東京都大田区下丸子3丁目30番2号キャノン株式会社内

(72) 発明者 小林 達也
東京都大田区下丸子3丁目30番2号キャノン株式会社内

(72) 発明者 小林 達也
東京都大田区下丸子3丁目30番2号キャノン株式会社内

[図3]



[図5]

